

CLAIMS

1. A nucleic acid sequence comprising a nucleic acid sequence of at least 65% identity to a nucleic acid sequence as set forth in as set forth in SEQ ID NO:1, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:7, SEQ ID NO:9, SEQ ID NO:11, SEQ ID NO:13, SEQ ID NO:15, SEQ ID NO:17, SEQ ID NO:19, SEQ ID NO:21, SEQ ID NO:23, SEQ ID NO:25, SEQ ID NO:27, SEQ ID NO:29, SEQ ID NO:31, SEQ ID NO:33, SEQ ID NO:35, SEQ ID NO:37, SEQ ID NO:39, SEQ ID NO:41, SEQ ID NO:43, SEQ ID NO:45, SEQ ID NO:47, SEQ ID NO:49, SEQ ID NO:51, SEQ ID NO:53, SEQ ID NO:55, SEQ ID NO:57, SEQ ID NO:59, SEQ ID NO:61, SEQ ID NO:63, SEQ ID NO:65, SEQ ID NO:67, SEQ ID NO:69, SEQ ID NO:71, SEQ ID NO:73, SEQ ID NO:75, SEQ ID NO:77, SEQ ID NO:79, SEQ ID NO:81, SEQ ID NO:83, SEQ ID NO:85, SEQ ID NO:87, SEQ ID NO:89, SEQ ID NO:91, SEQ ID NO:93, SEQ ID NO:95, SEQ ID NO:97, SEQ ID NO:99, SEQ ID NO:101, SEQ ID NO:103, SEQ ID NO:105, SEQ ID NO:107, SEQ ID NO:109, SEQ ID NO:111, SEQ ID NO:113, SEQ ID NO:115, SEQ ID NO:117, SEQ ID NO:119, SEQ ID NO:121, SEQ ID NO:123, SEQ ID NO:125, SEQ ID NO:127, SEQ ID NO:129, SEQ ID NO:131, SEQ ID NO:133, SEQ ID NO:135, SEQ ID NO:137, SEQ ID NO:139, SEQ ID NO:141, SEQ ID NO:143, SEQ ID NO:145, SEQ ID NO:147, SEQ ID NO:149, SEQ ID NO:151, SEQ ID NO:153, SEQ ID NO:155, SEQ ID NO:157, SEQ ID NO:159, SEQ ID NO:161, SEQ ID NO:163, SEQ ID NO:165, SEQ ID NO:167, SEQ ID NO:169, SEQ ID NO:171, SEQ ID NO:173, SEQ ID NO:175, SEQ ID NO:177, SEQ ID NO:179, SEQ ID NO:181, SEQ ID NO:183, SEQ ID NO:185, SEQ ID NO:187, SEQ ID NO:189, SEQ ID NO:191, SEQ ID NO:193, SEQ ID NO:195, SEQ ID NO:197, SEQ ID NO:199, SEQ ID NO:201, SEQ ID NO:203, SEQ ID NO:205, SEQ ID NO:207, SEQ ID NO:209, SEQ ID NO:211, SEQ ID NO:213, SEQ ID NO:215, SEQ ID NO:217, SEQ ID NO:219, SEQ ID NO:221, SEQ ID NO:223, SEQ ID NO:225, SEQ ID NO:227, SEQ ID NO:229, SEQ ID NO:231, SEQ ID NO:233, SEQ ID NO:235, SEQ ID NO:237, SEQ ID NO:239, SEQ ID NO:241, SEQ ID NO:243, SEQ ID NO:245, SEQ ID NO:247, SEQ ID NO:249, SEQ ID NO:251, SEQ ID NO:253, SEQ ID NO:255, SEQ ID NO:257, SEQ ID NO:259, SEQ ID NO:261, SEQ ID NO:263, SEQ ID NO:265, SEQ ID NO:267, SEQ ID NO:269, SEQ ID NO:271, SEQ ID NO:273, SEQ ID NO:275, SEQ ID NO:277, SEQ ID NO:279, SEQ ID NO:281, SEQ ID NO:283, SEQ ID NO:285, SEQ ID NO:287, SEQ ID NO:289, SEQ ID NO:291, SEQ ID NO:293, SEQ ID NO:295, SEQ ID NO:297, SEQ ID NO:299, SEQ ID NO:301, SEQ ID

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2. The nucleic acid sequence of claim 2, wherein said sequence has at least 95% identity.
3. The nucleic acid sequence of claim 3, wherein said sequence has 100% identity.
4. A vector comprising a nucleic acid sequence of claim 1, 2 or 3.
5. A cell comprising the vector of claim 4.
6. A feed or feed supplement comprising a recombinant protein or biologically active fragment thereof encoded by a nucleic acid sequence having at least 65% sequence identity to a shrimp gene or fragment thereof, wherein said shrimp gene is up-regulated during viral infection.
7. The feed or feed supplement of claim 6, wherein the shrimp gene is selected from a group of genes consisting of tetraspanin-2, P-selectin precursor, T-cell activation protein, anti-lipopolysaccharide factor, and heat shock protein STI1.

8. The feed or feed supplement of claim 7, wherein the shrimp gene is contained in clone PvW11A5, clone PvW4E03, clone PvW5G04, clone PvHB11, or clone PvW10D06.

9. The feed or feed supplement of claim 6, wherein said protein or biologically active fragment thereof is encoded by a nucleic acid listed in Appendix A2.

10. The feed or feed supplement of claim 6, wherein said protein is contained within a cell or provided as a disrupted cell.

11. A feed or feed supplement comprising a nucleic acid sequence of at least 65% sequence identity to a shrimp gene or biologically active portion thereof in a set of genes up-regulated by infection with a virus.

12. The feed or feed supplement of claim 11, wherein said nucleic acid sequence is a nucleic acid sequence listed in Appendix A2.

13. The feed or feed supplement of claim 11, wherein the shrimp gene is selected from a group of shrimp genes consisting of tetraspanin-2, P-selectin precursor, T-cell activation protein, anti-lipopolysaccharide factor, and heat shock protein STI1.

14. The feed or feed supplement of claim 11, wherein the shrimp gene is contained in clone PvW11A5, clone PvW4E03, clone PvW5G04, clone PvHB11, or clone PvW10D06.

15. The feed or feed supplement of claim 11, wherein said nucleic acid sequence is contained within a cell or provided as a disrupted cell.

16. The feed or feed supplement of claim 11, wherein said nucleic acid sequence is produced synthetically.

17. A feed or feed supplement comprising a recombinant protein or biologically active fragment thereof encoded by a nucleic acid sequence with at least 65% or sequence identity to a nucleic acid sequence found in the set of shrimp genes down-regulated with viral infection.

18. The feed or feed supplement of claim 17, wherein the protein is gamma-interferon inducible lysosomal thiol reductase precursor, interleukin enhancer-binding factor 3, NF-kappaB essential modulator, chitinase, prophenoloxidase-activating proteinase 2, O-sialoglycoprotein endopeptidase, ubiquitin, or lysozyme.

19. The feed additive or supplement of claim 17, wherein the protein is encoded by a nucleic acid sequence selected from the group of shrimp nucleic acid sequence contained in clonePvH1A02, clone PvW8B06, clone PvW8E09, clone PvW9E11, clone PvW4F07, clone PvHC06, clone PvW04C06, and clone PvW10F4.

20. The feed or feed supplement of claim 17, wherein said protein or biologically active fragment thereof is encoded by a nucleic acid sequence listed in Appendix A1.

21. The feed or feed supplement of claim 17, wherein said protein is provided within a cell or provided as a disrupted cell.

22. A feed or feed supplement comprising a nucleic acid sequence with at least 65% sequence identity to a shrimp gene or biologically active fragment thereof, wherein said nucleic acid sequence encodes a shrimp gene down-regulated at or during viral infection.

23. The feed or feed supplement of claim 22, wherein the nucleic acid sequence is one listed in Appendix A.

24. The feed or feed supplement of claim 22, wherein the shrimp gene is gamma-interferon inducible lysosomal thiol reductase precursor, interleukin enhancer-binding factor 3, NF-kappaB essential modulator, chitinase, prophenoloxidase-activating proteinase 2, O-sialoglycoprotein endopeptidase, ubiquitin, and lysozyme.

25. The feed or feed supplement of claim 22, wherein the nucleic acid sequence is contained in clonePvH1A02, clone PvW8B06, clone PvW8E09, clone PvW9E11, clone PvW4F07, clone PvHC06, clone PvW04C06, and clone PvW10F4.

26. The feed or feed supplement of claim 22, wherein said nucleic acid sequence is provided within a cell or provided as a disrupted cell.

27. The feed or feed supplement of claim 22, wherein said nucleic acid sequence is produced synthetically.

28. A therapeutic comprising a recombinant protein or biologically active portion thereof having at least 65% sequence identity to a shrimp protein encoded by a shrimp gene up-regulated during viral infection.

29. The therapeutic of claim 28, wherein the shrimp gene is a nucleic acid sequence listed in Appendix A2.

30. The therapeutic of claim 28, wherein the shrimp gene is tetraspanin-2, P-selectin precursor, T-cell activation protein, anti-lipopolysaccharide factor, and heat shock protein STI1.

31. The therapeutic of claim 28, wherein the shrimp gene is contained in clone PvW11A5, clone PvW4E03, clone PvW5G04, clone PvHB11, and clone PvW10D06.

32. The therapeutic of claim 28, wherein said protein or biologically active portion thereof is delivered orally.

33. The therapeutic of claim 28, wherein said protein or biologically active portion thereof is delivered by immersion.

34. The therapeutic of claim 28, wherein said protein or biologically active portion thereof is delivered by injection.

35. A therapeutic comprising a nucleic acid sequence of at least 65% or greater sequence identity to a shrimp gene or biologically active fragment thereof that is up-regulated by infection with a virus.

36. The therapeutic of claim 35, wherein the shrimp gene is selected from those listed in Appendix A2.

37. The therapeutic of claim 35, wherein the shrimp gene is tetraspanin-2, P-selectin precursor, T-cell activation protein, anti-lipopolysaccharide factor, and heat shock protein STI1.

38. The therapeutic of claim 35, wherein the shrimp gene is contained in clone PvW11A5, clone PvW4E03, clone PvW5G04, clone PvHB11, and clone PvW10D06.

39. The therapeutic of claim 35, wherein said nucleic acid sequence is delivered orally.

40. The therapeutic of claim 35, wherein said nucleic acid sequence is delivered by immersion.

41. The therapeutic of claim 35, wherein said nucleic acid sequence is delivered by injection.

42. A therapeutic comprising a recombinant protein or biologically active fragment thereof encoded by a nucleic acid sequence with at least 65% sequence identity to a shrimp protein down-regulated by infection with a virus.

43. The therapeutic of claim 42, wherein said protein or biologically active fragment thereof is encoded by a nucleic acid sequence listed in Appendix A1.

44. The therapeutic of claim 42, wherein the protein or biologically active fragment thereof is gamma-interferon inducible lysosomal thiol reductase precursor, interleukin enhancer-binding factor 3, NF-kappaB essential modulator, chitinase, prophenoloxidase-activating proteinase 2, O-sialoglycoprotein endopeptidase, ubiquitin, or lysozyme.

45. The therapeutic of claim 42, wherein the protein or biologically active fragment thereof is encoded by a nucleic acid sequence contained in clone PvH1A02, clone PvW8B06, clone PvW8E09, clone PvW9E11, clone PvW4F07, clone PvHC06, clone PvW04C06, or clone PvW10F4.

46. The therapeutic of claim 42, wherein said protein or biologically active fragment thereof is delivered orally.

47. The therapeutic of claim 42, wherein the protein or biologically active fragment thereof is delivered by immersion.

48. The therapeutic of claim 42, wherein the protein or biologically active fragment thereof is delivered by injection.

49. A therapeutic comprising a nucleic acid sequence of at least 65% sequence identity to a shrimp gene or faction thereof down-regulated by infection with a virus.

50. The therapeutic of claim 49, wherein said nucleic acid sequence is one listed in Appendix A1.

51. The therapeutic of claim 49, wherein said nucleic acid sequence is gamma-interferon inducible lysosomal thiol reductase precursor, interleukin enhancer-binding factor 3, NF-kappaB essential modulator, chitinase, prophenoloxidase-activating proteinase 2, O-sialoglycoprotein endopeptidase, ubiquitin, and lysozyme.

52. The therapeutic of claim 49, wherein the nucleic acid sequence is contained in clone PvH1A02, clone PvW8B06, clone PvW8E09, clone PvW9E11, clone PvW4F07, clone PvHC06, clone PvW04C06, or clone PvW10F4.

53. The therapeutic of claim 49, wherein said nucleic acid sequence is delivered orally.

54. The therapeutic of claim 49, wherein said nucleic acid sequence is delivered by immersion.

55. The therapeutic of claim 49, wherein said nucleic acid sequence is delivered by injection.

56. A screening method for identifying a substrate of a protein that is up-regulated following infection by a pathogen, comprising:

(a) providing a polypeptide of the invention; or a polypeptide encoded by a nucleic acid of the invention;

(b) providing a test substrate; and

(c) contacting the polypeptide of step (a) with the test substrate of step (b) and detecting a decrease in the amount of substrate or an increase in the amount of reaction product,

wherein a decrease in the amount of the substrate or an increase in the amount of a reaction product identifies the test substrate as the polypeptide substrate.

57. The screening method of claim 56, wherein the protein is encoded by a nucleic acid sequence selected from Appendix A2.

58. The screening method of claim 56, wherein the protein is tetraspanin-2, P-selectin precursor, T-cell activation protein, anti-lipopolysaccharide factor, or heat shock protein STI1.

59. The screening method of claim 56, wherein the protein is encoded by the nucleic acid sequence contained in clone PvW11A5, clone PvW4E03, clone PvW5G04, clone PvHB11, or clone PvW10D06.

60. A screening method for identifying a substrate of a protein that is down-regulated following infection by a pathogen, comprising:

(a) providing a polypeptide of the invention; or a polypeptide encoded by a nucleic acid of the invention;

(b) providing a test substrate; and

(c) contacting the polypeptide of step (a) with the test substrate of step (b) and detecting a decrease in the amount of substrate or an increase in the amount of reaction product,

wherein a decrease in the amount of the substrate or an increase in the amount of a reaction product identifies the test substrate as the polypeptide substrate.

61. The screening method of claim 60, wherein the protein is encoded by a nucleic acid sequence selected from Appendix A1.

62. The screening method of claim 60, wherein the protein is gamma-interferon inducible lysosomal thiol reductase precursor, interleukin enhancer-binding factor 3, NF-kappaB essential modulator, chitinase, prophenoloxidase-activating proteinase 2, O-sialoglycoprotein endopeptidase, ubiquitin, or lysozyme.

63. The screening method of claim 60, wherein the protein is encoded by the nucleic acid sequence contained in clone PvH1A02, clone PvW8B06, clone PvW8E09, clone PvW9E11, clone PvW4F07, clone PvHC06, clone PvW04C06, or clone PvW10F4.

64. A diagnostic kit for evaluation of infection in crustaceans in aquaculture and food processing comprising at least one differentially expressed gene as a nucleic acid or recombinant polypeptide, wherein the gene can be used to identify a crustacean as being infected or non-infected with the pathogen of interest; and optionally instructions for use of the kit.

65. The diagnostic kit of claim 64, wherein the gene is one selected from Appendix A1 or Appendix A2.

66. A method for treating or preventing infection by a pathogen in an aquatic animal, comprising providing at least one differentially expressed gene as a nucleic acid or recombinant polypeptide, wherein the gene is up-regulated with infection by the pathogen.

67. The method of claim 66, wherein the gene is one selected from Appendix A2.

68. The method of claim 66, wherein the gene is tetraspanin-2, P-selectin precursor, T-cell activation protein, anti-lipopolysaccharide factor, or heat shock protein STI1.

69. The method of claim 66, wherein the gene is contained in clone PvW11A5, clone PvW4E03, clone PvW5G04, clone PvHB11, or clone PvW10D06.

70. A method for treating or preventing infection by a pathogen in an aquatic animal, comprising providing at least one differentially expressed gene as a nucleic acid or recombinant polypeptide, wherein the gene is down-regulated with infection by the pathogen.

71. The method of claim 70, wherein the gene is one selected from Appendix A1.
72. The method of claim 70, wherein the gene is gamma-interferon inducible lysosomal thiol reductase precursor, interleukin enhancer-binding factor 3, NF-kappaB essential modulator, chitinase, prophenoloxidase-activating proteinase 2, O-sialoglycoprotein endopeptidase, ubiquitin, or lysozyme.
73. The method of claim 70, wherein the gene is the nucleic acid sequence contained in clonePvH1A02, clone PvW8B06, clone PvW8E09, clone PvW9E11, clone PvW4F07, clone PvHC06, clone PvW04C06, or clone PvW10F4.
74. The method of claim 66 or 70, wherein the aquatic animal is a crustacean.
75. The method of claim 74, wherein the crustacean is a shrimp.
76. An inhibitory RNA molecule comprising a nucleic acid sequence comprising a nucleic acid sequence or fragment thereof, or complementary sequence, of the nucleic acid sequence listed in Appendix A1 or A2.
77. A method of preventing or treating infection of an aquatic animal comprising administering the inhibitory RNA molecule of claim 76.
78. A feed or feed supplement comprising the inhibitory RNA molecule of claim 76.
79. The feed or feed supplement of claim 78, wherein the inhibitory RNA molecule is provided in a cell or as a disrupted cell.
80. The feed or feed supplement of claim 79, wherein the cell is a bacterial, yeast, insect, fish, crustacean, or mammalian cell.
81. A method of identifying shrimp lines that are resistant to viral, bacterial, or fungal diseases, comprising identifying at least one differentially expressed gene as a nucleic

acid or protein, wherein the gene comprises a nucleic acid sequence provided in Appendix A1 or Appendix A2.

82. A method of screening for a therapeutic that modulates infectious disease in an aquatic animal, comprising identifying a compound which modulates the expression of the gene as a nucleic acid sequence or protein in an infected animal, wherein the gene comprises a nucleic acid sequence listed in Appendix A1 or Appendix A2,

whereby the compound is identified as a modulator of infectious disease when said modulation results in the amelioration or prevention of one or more symptoms caused by the infection.

83. A microsatellite marker comprising at least one nucleic acid sequence listed in Appendix A1 or Appendix A2.

84. A method of developing microsatellite markers employing at least one nucleic acid sequence listed in Appendix A1 or Appendix A2.

85. A microarray comprising at least one nucleic acid sequence or biologically active fragment thereof listed in Appendix A1 or Appendix A2.

86. A biopesticide comprising at least one nucleic acid sequence or biologically active fragment thereof listed in Appendix A1 or Appendix A2.

87. A method for developing a biopesticide employing at least one nucleic acid sequence or biologically active fragment thereof listed in Appendix A1 or Appendix A2.

88. A transgenic plant expressing a protein or biologically active fragment thereof encoded by a nucleic acid sequence disclosed in Appendix A1 or Appendix A2.